

Remarks

Claims 1-5, 7-8, 13-15, and 30-32 remain in the application.

The examiner has rejected claims 1-5, 7-9, 13-15, and 30-32 under 35 U.S.C. §103(a) as being obvious over Moslehi (US 4,891,499, hereafter Moslehi '499), in view of Ballance et al. (US 6,090,2210, hereafter Ballance) or Anderson et al. (US 6,113,703, hereafter Anderson).

This rejection is traversed for much the same reasons the Board of Appeals and Patent interferences determined that these claims were allowable over the same art. The detectors of Moslehi '499 do not measure temperature at a plurality of positions but are used only to measure a difference in temperature between two points, specifically the sign of the temperature difference, so as to adjust the edge heater element to "make the edge temperature equal to the center temperature in a feedback control loop." (col. 4, ll. 34-38).

The support ring 46 of Moslehi '499 does not conform to the common definition of a shelf and his pins 50 apparently having a sloping surface are not annular. Claim 3 has been amended to require that the shelf contacts the wafer. Claim 13 has been amended to requiring holding the wafer on an annular surface of the ring. Claim 32 already requires an annular sloping shelf. In contrast, Moslehi '499 states that the "quartz ring 46 is spaced apart a uniform distance around the wafer 26 in contact with pins 50 only." (col. 6, ll. 59-61) contrary to amended claim 3 and his pins do not have a sloping annular shelf of claim 32.

The examiner's reliance upon Anderson is misplaced. Anderson's inventive chamber is not even an RTP chamber because it radiantly heats a black-body chamber formed by the two heater plates 60, 62 sandwiching the wafer 12 and thus become a hot-wall reactor, not a cold-wall reactor such as the RTP chambers of Moslehi '499 and Balance. Such cold-wall chambers allow the rapid heating and cooling of the wafer based primarily on the current lamp radiation, not the temperature of the black-body chamber. More specifically, Anderson's pyrometers 60, 62 are directed to the heat plates 60 and the "[p]yrometers 24 and 22 measure the temperature of plates 60 and 62" (col. 4, lines 47-48), which are only "indicative of the temperature of the wafer 12

(col. 6, lines 3-5) since the bulk wafer temperature somewhat follows the temperatures of the monitored heat plates. Since the heat plates 60 and 62 are “opaque to infrared light” (col. 4, ll. 36-37), Anderson’s pyrometers 60, 62 are shielded from his wafer 12 and thus cannot monitor a side of the wafer and especially cannot pyrometrically monitor the wafer surfaces. Anderson’s top and bottom pyrometers are intimately tied to Anderson’s heating cavity and teach nothing about directly pyrometrically monitoring both sides or surfaces of a wafer.

Claim 1 requires pyrometrically monitoring the front side of the substrate. Anderson pyrometrically monitors each of his heat plate 60, 62, which are indicative of the bulk temperature of his wafer, not its surface. Claim 1 has been amended to require that the monitoring include receiving radiation radiantly emitted from the substrate. Anderson receives radiation radiantly emitted his heat plates 60, 62, not from his wafer.

For claim 2, Anderson is incapable of measuring temperatures at a plurality of radial positions of the wafer but only the single internal temperature of the black-body cavity defined by his heat plates 60, 62.

Moslehi ‘499 does not pyrometrically monitor but measures the temperature dependence of laser beam reflectance. Ballance pyrometrically monitors the back side, not the front side of his wafer.

Claim 3 has been amended to more carefully recite the annular shelf contact the periphery of the front side of the substrate, a feature not found in any of the applied art.

To simplify prosecution, claim 9 has been incorporated into claim 8 with the monitoring required to be pyrometric, which now requires the wafer front surface to face the reflector plate and pyrometric monitoring a plurality of positions on the front side. Moslehi ‘499 does not pyrometrically monitor and indeed he measures only a temperature gradient across a space on the wafer, not monitoring multiple temperatures. Ballance pyrometrically monitors the wafer backside. Anderson pyrometrically monitors one position on each of the two heat plates, not multiple positions on the wafer.

Claim 13 has been amended to more directly recite an annular holding surface. Such is not disclosed in the applied art.

Claim 15 requires not only the annular ring but also a detachable holding member for holding the wafer from a top side thereof. The examiner does not discuss this claim. It is not seen where a such a detachable holding member is found in Moslehi '499, Ballance, or Anderson.

Claim 32 recites the annular sloping shelf including in the holding means. No art has been shown for such.

The Commissioner is authorized to charge Deposit Account 50-0636 for any required fees including extra claim fees.

In view of the above amendments and remarks, reconsideration and allowance of all claims are respectfully requested. If the Examiner believes that a telephone interview would be helpful, he is invited to contact the undersigned attorney at the listed telephone number, which is on California time.

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Respectfully submitted,

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